

# Hybrid Gas-Electric Propulsion Concept

Completed Technology Project (2013 - 2020)



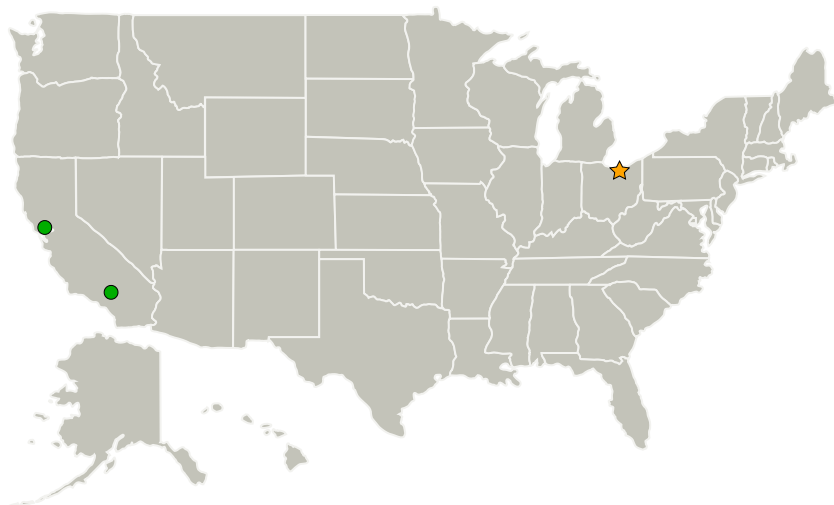
## Project Introduction

Hybrid Gas-Electric Propulsion Concept establishes viable concept for 5-10 MW hybrid gas-electric propulsion system for a commercial transport aircraft.

## Anticipated Benefits

Electrified propulsion has the potential to provide substantial improvements in aircraft fuel burn and energy usage, and has further potential to improve emissions and noise. This technical challenge explores concepts and establishes the feasibility of the underlying technologies that will be required to obtain these savings in order to enable the paradigm shift from gas-turbine to electrified propulsion.

## Primary U.S. Work Locations and Key Partners



Hybrid Gas-Electric Propulsion Concept

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Organizations Performing Work	Role	Type	Location
★ Glenn Research Center(GRC)	Lead Organization	NASA Center	Cleveland, Ohio
● Ames Research Center(ARC)	Supporting Organization	NASA Center	Moffett Field, California
● Armstrong Flight Research Center(AFRC)	Supporting Organization	NASA Center	Edwards, California
Carnegie Mellon University	Supporting Organization	Academia	Pittsburgh, Pennsylvania
Case Western Reserve University	Supporting Organization	Academia	Cleveland, Ohio
Department of Energy(DoE)	Supporting Organization	US Government	Washington, District of Columbia
Empirical Systems Aerospace, Inc. (ESAero)	Supporting Organization	Industry	Pismo Beach, California
General Electric Global Research	Supporting Organization	Industry	Niskayuna, New York
Georgia Institute of Technology-Main Campus(GA Tech)	Supporting Organization	Academia	Atlanta, Georgia
National Energy Technology Laboratory(NETL)	Supporting Organization	R&D Center	Albany, Oregon
North Carolina State University at Raleigh	Supporting Organization	Academia	Raleigh, North Carolina

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## Organizational Responsibility

**Responsible Mission Directorate:**

Aeronautics Research Mission Directorate (ARMD)

**Lead Center / Facility:**

Glenn Research Center (GRC)

**Responsible Program:**

Advanced Air Vehicles

## Project Management

**Program Director:**

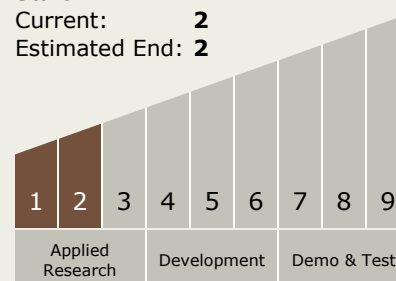
James A Kenyon

**Project Manager:**

James D Heidmann

## Technology Maturity (TRL)

Start: **1**  
 Current: **2**  
 Estimated End: **2**



## Technology Areas

**Primary:**

Continued on following page.

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Organizations Performing Work	Role	Type	Location
Ohio State University-Main Campus	Supporting Organization	Academia	Columbus, Ohio
Physical Sciences, Inc.	Supporting Organization	Industry	Andover, Massachusetts
Rolls-Royce North American Technologies	Supporting Organization	Industry	
The Boeing Company(Boeing)	Supporting Organization	Industry	Chicago, Illinois
United Technologies Research Center	Supporting Organization	Industry	
University of California-Berkeley(Berkeley)	Supporting Organization	Academia	Berkeley, California
University of Illinois at Urbana-Champaign	Supporting Organization	Academia	Urbana, Illinois
University of Kentucky	Supporting Organization	Academia	Lexington, Kentucky

Technology Areas  
(cont.)

- TX01 Propulsion Systems
  - ↳ TX01.3 Aero Propulsion
  - ↳ TX01.3.9 Hybrid Electric Systems

Target Destination  
Earth

## Project Transitions

**October 2013:** Project Start**September 2020:** Closed out

**Closeout Summary:** A confluence of aircraft system studies, component and subcomponent development, and integrated testing have been orchestrated to demonstrate feasibility of electrified aircraft propulsion for commercial transport aircraft up to the narrow body/single aisle size class. Investment in this technology area has grown significantly beyond the investment of this subproject; this broad investment shows that the challenge of showing viability has been met.

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### Project Website:

<https://www.nasa.gov/aeroresearch/programs/aavp/aatt>